

INCH-POUND

A-A-59364  
21 January 1999  
SUPERSEDING  
MIL-T-23480A  
27 September 1990

## COMMERCIAL ITEM DESCRIPTION

## TUMBLER-DRYER, LAUNDRY, STEAM, AND ELECTRIC (NAVAL SHIPBOARD)

The General Services Administration has authorized the use of this commercial item description for all federal agencies.

## 1. SCOPE

This commercial item description (CID) covers the 50-pound and 100-pound dry weight capacity modified commercial laundry tumbler-dryer machines for Naval shipboard use.

## 2. CLASSIFICATION

Type 1: Steam heated  
Size 1 - 50-pound dry weight  
Size 2 - 100-pound dry weight

Type 2: Electrically heated  
Size 1 - 50-pound dry weight

## 3. SALIENT CHARACTERISTICS

3.1 Design and construction. The tumbler-dryer shall be a reversing, open end, once through, end loading machine constructed so that the heated air does not circulate back through the cylinder. Components shall be arranged so that side clearance shall not be required for installation or maintenance. This will allow for multiple tumbler-dryers to be placed side-by-side. The tumbler-dryer shall adequately hold a load of cotton cloth not less than 50 pounds dry weight for a size 1 tumbler-dryer and 100 pounds dry weight for a size 2 tumbler-dryer. The size 1 unit shall weigh not greater than 900 pounds; the size 2 unit shall weigh not greater than 1650 pounds.

3.1.1 Housing. The entire unit shall be enclosed in a housing finished for corrosion resistance. The housing enclosing the machine shall be tight except for the inlet, outlet, access plate, and door openings. When in place, doors and access plates shall be tight fitting. Doors or access plates shall be provided and shall be sized to ensure adequate accessibility for maintenance and repair of the unit. The unit housing shall encase the insulation with internal stiffening members. The interior surfaces shall consist of a smooth-to-the-touch finish and shall preclude lint buildup.

Beneficial comments, recommendations, additions, deletions, clarifications, etc., and any other data which may improve this document should be sent to: Commander, Naval Sea Systems Command, 2531 Jefferson Davis Highway, Arlington, VA 22242-5160.

AMSC N/A

FSC 3510

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A-A-59364

3.1.2 Selective temperatures. Temperature settings shall be manually adjustable, and a digital temperature indicator shall be provided. A thermostatic control, which operates the steam solenoid valve on the type 1 tumbler-dryers or the electric heater control on the type 2 tumbler-dryers shall maintain either of the two selectable temperatures of 155 °F and 185 °F  $\pm$  10 °F. An indicator light shall be provided in the vicinity of the control panel and activate while the steam coil or electric heating element is energized.

3.1.2.1 Temperature limit control. In addition to the primary thermostatic control (paragraph 3.1.2) a back up high limit heat sensor shall be located in the lint chamber below the cylinder which shall interrupt steam flow on type 1 dryers or power on type 2 dryers to the heating elements should the cylinder temperature exceed 215 °F  $\pm$  10 °F. Reset shall be accomplished automatically. Also, the steam solenoid coil on type 1 dryers or the heating element contactor on type 2 dryers shall be interlocked with the fan motor contactor which shall interrupt heating in the event of fan motor failure. (Shipboard requirement, see 7.2)

3.1.3 Timed drying cycle. A timer with a range of 0 to 60 minutes and an indicator light shall be provided for selecting the drying time and indicating normal drying operation.

3.1.4 Cool down cycle. Immediately following the drying cycle the heating elements shall be de-energized and a cool down cycle shall be automatically activated until the cylinder temperature drops to 135 °F. An indicator light shall be provided in the vicinity of the control panel and activate during the cool down cycle. An audible signal shall energize at the end of the cool down cycle and shall continue until manually turned off.

3.1.5 Sweep sheets. The sweep sheets shall be corrosion resistant and cylindrical in shape. If adequate access is not provided through the lint chamber, access plates shall be provided in the front and rear for removing lint from between the cylinder basket, sweep sheets, and housing.

3.1.6 Door. An insulated loading door concentric with the cylinder opening shall be provided at the front of the housing. The door shall act as a baffle for retaining the load within the cylinder. It shall be of the same material as the housing and shall be durably hinged. The door shall be provided with a handle and a means of latching when it is closed and when it is opened to a minimum of 135 degrees from the closed position. Magnetic devices shall not be used. An electric interlock shall be provided to prevent any rotation of the cylinder when the door is in the open position. The latching mechanism shall allow a person trapped within the cylinder basket to push the door open.

3.1.7 Exhaust. An opening shall be provided for exhausting air after passage through the tumbler and filter. The opening shall be provided with an exhaust duct for connecting to the ship's ventilation system and shall be of sufficient volume to meet the requirements of 3.4.

3.1.7.1 Fan. A fan of sufficient capacity to meet the drying requirements of 3.4.1 shall be provided.

3.1.8 Lint box and screens. A box shall be provided with a corrosion resistant wire mesh screen through which all exhaust air shall flow. The screen shall be installed between the cylinder and the fan. The screen shall be accessible, cleanable, and removable from the front of the tumbler-dryer. The screen size shall be number 14 wire mesh or equivalent. An access door shall be provided with a keyless handle to provide quick and convenient access to the lint screen.

A-A-59364

3.1.9 Heating unit, type 1, steam heated. The heating unit shall consist of a continuous tube with closely spaced fins for efficient heat transfer. Coils shall be suitable for a steam pressure of 100 psi gauge and provided with a 1-inch female taper pipe thread size inlet and outlet connections. The heating unit shall be in accordance with the ASME Boiler and Pressure Vessel Code, section II and VIII. The heater shall be located in a position which produces even heating and distribution of the air entering the cylinder. No leaks or distortion shall be permitted anywhere in the system.

3.1.10 Heating unit, type 2, electrically heated. Heating elements shall be configured into an assembly within a chamber. Element shaping shall be done by the heating element manufacturer. Each element shall be fastened securely at one end and supported or fastened at the other end. The heating element shall be easily removable from the front of the tumbler-dryer. The heating element assembly shall be integrated with the temperature controls. The heating element assembly power requirements shall be not greater than 36 kilowatts when operated in the high temperature mode, and shall balance a three-phase load. The electric heating elements on the type 2 unit shall withstand a dielectric voltage of twice the rated line voltage plus 1000 volts without the element shorting. The cold and hot insulation resistance shall be not less than 25 and 10 megohms, respectively.

3.1.11 Insulation of housing. The outer housing, door and other components contacted by the operator shall be insulated from internal heat sources so that not more than 15 percent of the surface of the outer housing exceeds a temperature of 35 °F above the ambient air temperature. Insulation shall be encased to hold the insulation in place and to prevent settling, crumbling, or flaking within the housing.

3.1.12 Physical size limitations. The unit shall pass or shall be provided with a means of disassembly so that it can pass through a shipboard access measuring 26 x 66 inches with 8-inch radius corners and reassembled within the ship without hotwork such as welding and brazing. (Shipboard requirement, see 7.2)

3.1.13 Deck mounting. Provisions shall be made for mechanically securing the unit to a rigid hull foundation or for securing the unit to deck pads which are in turn secured to the deck. Mounting pads shall be secured to an area of the tumbler-dryer cabinet structure to ensure adherence under ship motion and vibration. When subjected to shipboard accelerations of 31g's vertically and 25g's horizontally through the center of gravity of the machine, the feet, legs, and mounting frames shall not exceed the yield points of their materials. (Shipboard requirement, see 7.2)

3.1.14 Dimensions. Maximum volumetric dimensions of equipment shall be as listed in table 1.

TABLE 1. Maximum volumetric dimensions (inches)

Size	Height	Width	Depth
1	80	40	52
2	90	50	68

## 3.2 Materials.

3.2.1 General. The tumbler-dryer shall be provided with a structural frame, base, and strength members constructed of malleable iron, ductile iron, or steel. No brittle materials are to be used for these parts. The unit frame shall be constructed to provide rigid and durable support for housing, cylinder heating unit, fan motor, and driving mechanism. The tumbler-dryer

A-A-59364

shall be free from asbestos and from cadmium parts or coatings in any form. Piping shall be constructed from stainless steel or copper. Fittings shall be constructed from bronze. Valves shall be constructed from cast bronze.

3.2.2 Stainless steel. Stainless steel materials shall be in accordance with ASTM A167, type 302 or 304. Bolts, screws, nuts, or other parts used for securing stainless steel parts shall also be stainless steel.

3.2.3 Cylinder.

3.2.3.1 Cylinder basket. The cylinder basket shall be perforated hot-dipped galvanized sheet steel in accordance with ASTM A123, or other materials with equal or better corrosion resistance, material strength, and heat strength characteristics. Surface coatings or finishes shall not stain the clothing within the cylinder basket. The back sheet of the cylinder basket shall be solid. The front sheet of the cylinder basket shall have a circular opening to match the protruding section of the door. The cylinder shall be driven by a steel cylinder drive shaft welded to a steel transmitter, which shall be bolted to the rear cylinder head. The cylinder shall be provided with lifting ribs equally spaced around the cylinder. Through tie-rods shall be installed within the lifting ribs to increase the rigidity of the cylinder.

3.2.3.2 Cylinder drive shaft. The cylinder drive shaft shall be hard, strong steel to ensure safe and durable operation that will withstand ship-induced vibrations. The drive shaft shall be machined for a proper fit with the bearing sleeves at the back of the unit.

3.2.3.3 Cylinder bearings. The cylinder shall be supported at the rear by two heavy-duty roller bearings. The bearings shall be readily renewable and be of sufficient capacity and durability to provide rotation of the cylinder under full load conditions without vibration for not less than 5000 hours.

3.2.3.4 Transmitter. The transmitter shall have steel extensions extending to the full cylinder radius and shall be securely bolted to the back sheet of the cylinder and welded to the cylinder drive shaft.

3.2.3.5 Drive adjustment. A means shall be provided for adjusting the cylinder alignment via the cylinder belts or chains. Means for adjustment shall be readily accessible.

3.2.4 Electrical tubular heating elements, type 2. Tubular heating element sheath material on type 2 tumbler-dryers shall be made of monel-400 with hermetic ends sealed or material having equivalent corrosion resistance in a marine atmosphere and maximum operating temperature. The spiral wound resistor wire shall be made of 80 percent nickel and 20 percent chromium and suspended in the dielectric that shall be composed of compressed magnesium oxide.

3.3 Electrical requirements. The unit shall operate on 440 VAC, 60 Hz, three-phase power, as defined in DOD-STD-1399, Section 300, and shall have provisions for making direct (hardwired) connections for electric power (3 conductors) and for equipment grounding (1 conductor). All outermost metallic surfaces shall be grounded via the equipment grounding connection. The grounding resistance between any exposed metallic surfaces and the common ground point shall be not greater than 0.1 ohm. Electrical components, other than the hermetically sealed motor, shall be provided in accordance with NEMA 250, Type 13 or equivalent enclosure protection. Metal parts of electrical components and enclosures shall be inherently corrosion resistant or shall be treated and processed for corrosion resistance in accordance with IEEE Standard 45. (Shipboard requirement, see 7.2)

3.3.1 Electric motors. The motors shall be in accordance with NEMA MG1. The motors shall function under all operating conditions without exceeding

permissible temperature rise. The use of resilient motor mounts shall not be used. In addition, main drive motors shall have the following characteristics.

Service	C
Bearings	Ball
Insulation	Class B or F
Voltage	440 VAC, 60 Hz, three-phase
Cooling	Natural
Type	Squirrel cage induction
Ambient temperature	104 °F, maximum
Enclosure	Dripproof
Duty	Fan motor: Continuous Drive motor: Continuous reversing Maximum 4 reversals per minute Minimum 1 reversal per minute

3.3.2 Electric motor wire. Motors shall be wound with wire sizes conforming to the American Wire Gauge. Half size wire shall not be used.

3.3.3 Controllers. Motor controllers shall be of the magnetic type with overload protection relays. Motor controllers shall be provided with overload protection for motors of 1/8 horsepower or greater. Control circuits shall operate at 115 VAC. Reduced-voltage control circuits shall be protected by cartridge fuses and shall be sized not greater than 200 percent of the transformer kilovoltampere rating or 100 percent of the control wire amperage rating, whichever is smaller. Control buttons and switches shall be dripproof. Indicator lights for voltages in excess of 28 volts shall be of the transformer type with low-voltage lamps. Electrical components mounted outside the control panel shall be provided with dripproof enclosures. Solenoid valves shall be provided with high temperature epoxy encapsulated coils. The control equipment shall have the following characteristics.

Ambient temperature	104 °F
Enclosure	Dripproof
Operation	Manual or magnetic AC: across-line

3.3.4 Circuit breaker. A properly sized fuse disconnect box shall be installed on the 440 VAC electrical supply line. Properly sized fuses shall also be installed on the secondary side of the step-down transformer to protect the tumbler-dryer control circuitry.

### 3.4 Performance characteristics.

3.4.1 Drying efficiency. The tumbler-dryer shall remove moisture from clothes at the maximum load capacity, soaked with water to a wet weight of 150 percent of the maximum dry weight, at a water temperature of  $70 \pm 2$  °F. The tumbler-dryer shall remove 97 percent of the water from the load at a drying rate of 1.2 pounds of water per minute for the type 1 unit, and 0.8 pound of water per minute for the type 2 unit, when set at a drying temperature of 185 °F.

3.4.2 Reversing. Reversals per minute shall be set to provide the maximum water removal per minute within the range of duty for the drive motor as specified in 3.3.1.

3.4.3 Saturated steam. Pipes, fittings, coils, and chambers using steam shall be suitable for 100 psi saturated steam and shall show no signs of leakage.

A-A-59364

3.4.4 Shipboard power. Tumbler-dryer shall meet the following shipboard requirements. (Shipboard requirement, see 7.2)

<u>Requirement</u>	<u>Performance requirement</u>
Steady state voltage	The unit shall operate satisfactorily
Power interruption	The unit shall return to normal operation without deterioration in performance when power is restored
Leakage current	The leakage current for the unit under normal operation shall be not greater than 5 milliamperes
Power factor	The unit's overall power factor shall be maintained within the range of 0.8 lagging to 0.95 leading, under average voltage tolerance conditions
Load imbalance	The unit's load unbalance during normal operations shall be not greater than five percent
Insulation resistance	The unit's electrical components shall have a minimum cold insulation resistance of 10 megohms

3.5 Component attachment. Electrical components such as contactors, heating elements, terminal blocks, fuse blocks, and switches shall be securely attached to suitable plates, brackets, and the like, to preclude displacement under normal ship's motion. (Shipboard requirement, see 7.2)

3.6 Safety. Exposed parts, such as belts or chains, that may cause injury to personnel shall be covered with protective guards or shields. Such guards shall be readily removable where any maintenance is required. The back-up high limit heat sensor and fan motor electrical interlock (paragraph 3.1.2.1) shall interrupt or prevent heating should the cylinder temperature exceed  $215\text{ }^{\circ}\text{F} \pm 10\text{ }^{\circ}\text{F}$  or the blower motor fails. The unit shall not scorch its contents. For the electrically-heated type 2 heating unit, the temperature of electric heating elements shall be not greater than their maximum operating temperature.

3.7 Control devices, indicator lights and audible signals. Operator controls shall be oriented located for ease of use and identification for the operator and shall be not susceptible to accidental activation. Control stops shall be provided at indicated end positions or stopping points. Cycling through the "ON" and "OFF" positions shall be avoided. Controls shall be located adjacent to their associated displays. Each control and display shall be labeled according to its function. Audible signals or alarms generated by the tumbler-dryer shall not be so loud as to cause discomfort or ringing in the ears of a nearby operator.

3.8 Finish. Stainless steel shall have a type 2B or smoother finish, in accordance with ASTM A480. Exposed surfaces other than stainless steel shall be painted with a quality heat resistant paint of a color normally furnished on the manufacturer's commercial machine.

3.9 Label plates. The unit shall be provided with a data nameplate and an instruction plate, both attached to the front of the unit. They shall be readily visible during normal operating use and shall not adversely affect the life and utility of the unit.

A-A-59364

3.9.1 Data nameplate. The data nameplate shall contain the manufacturer's name, model, serial number, date manufactured, and any other information needed to uniquely identify the unit.

3.9.2 Instruction plate. The instruction plate shall provide instructions for start-up, operation, and shut-down.

3.10 Shock hazard labels. A label reading "Danger - Shock Hazard" shall be affixed to the outer case assembly, on or adjacent to each service access cover near one of the fasteners securing the cover. In addition, a warning label in accordance with UL 969 shall be placed near the high voltage components inside the equipment. This label shall include, but not be limited to the following texts:

- Danger - Shock Hazard.
- Power supply must be disconnected before servicing.
- Access covers must be in place before use.
- Service should be performed by authorized personnel only.

3.11 Inclined operation. The unit shall operate satisfactorily, in accordance with the requirements of this CID (such as the door remaining closed to prevent the loss of contents), when test-operated for 30 seconds inclined at an angle of 15° each side of the vertical, in each of two vertical planes at right angles to each other. The unit shall not deviate or rack from perpendicularity to the deck by more than 1/8 inch when the deck is inclined at an angle of 15°. (Shipboard requirement, see 7.2)

3.12 Environmental suitability. The unit shall be capable of withstanding ship's vibration and motion. Controls, switches, moving parts, and electrical circuits shall operate under shipboard conditions without malfunction, binding, excessive looseness, or damage, when tested in accordance with MIL-STD-167-1, type I equipment. The unit shall be secured to the test machine in the same manner that it will be secured on shipboard. (Shipboard requirement, see 7.2)

#### 4. REGULATORY REQUIREMENTS

The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation.

#### 5. QUALITY ASSURANCE PROVISIONS

5.1 Product conformance. The product provided shall meet the salient characteristics of this CID, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial market, or the same product that has been delivered to the Government for shipboard use on a previous procurement. The Government reserves the right to require proof of such compliance.

#### 6. PACKAGING

Preservation, packing, and marking shall be as specified in the contract or purchase order.

A-A-59364

7. NOTES

7.1 Ordering data.

- Title, number, and date of this CID
- Type and size
- When required, manuals shall be in accordance with ASTM F760

7.2 Shipboard requirement. Whenever a "(Shipboard requirement)" is included in a paragraph under SALIENT CHARACTERISTICS, it is meant that the requirement is something that is not normally offered to the commercial market by the manufacturer.

7.3 Sources of documents.

7.3.1 Military documents. Copies of documents required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.

- DOD-STD-1399 - Interface Standard for Shipboard Systems Section 300A  
Electric Power, Alternating
- MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment

7.3.2 American Society for Testing and Materials (ASTM) Standards. ASTM Standards are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

- ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel
- ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- ASTM A480 - General Requirements for Flat-Rolled and Heat-Resisting Steel Plate, Sheet, and Strip
- ASTM F760 - Food Service Equipment Manuals

7.3.3 American Society of Mechanical Engineers (ASME) Standards. ASME Standards are available from the American Society of Mechanical Engineers, 11 West 47th Street, New York, NY 10017.

- Boiler and Pressure Vessel Code
- Section II and VIII - Rules for Construction of Pressure Vessels

7.3.4 The Institute of Electrical and Electronic Engineers (IEEE) Standards. IEEE Standards are available from The Institute of Electrical and Electronic Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.

- IEEE 45 - IEEE Recommended Practice for Electric Installations on Shipboard

7.3.5 National Electrical Manufacturers Association (NEMA) Standards. NEMA Standards are available from the National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1847, Rosslyn, VA 22209.

- NEMA MG1 - Motors and Generators
- NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)

7.3.6 Underwriters Laboratories (UL) Standards. UL Standards are available from the Underwriters Laboratories Inc., 333 Pfingston Road, Northbrook, IL 60062.

- UL 969 - Marking and Labeling Systems

A-A-59364

7.4 Suggested sources of supply. Manufacturers of products known to meet the requirements of this CID are listed below. However, competition is not limited to these companies.

Hoyt Corporation  
251 Forge Rd  
Westport, MA 02790-1141

Cissell Manufacturing Company  
831 South First Street  
Louisville, KY 40232

MILITARY INTERESTS:

Custodian:  
Navy - SH

CIVIL AGENCY COORDINATING ACTIVITIES:  
GSA - FSS

Preparing activity:  
Navy - SH  
(Project 3510-0365)